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ABSTRACT

An introduction to protocol and training materials is presented in part I of this document. Emphasis is placed on protocol and training materials, evaluation of outcomes, and further steps to be taken. A three-item bibliography is included. Part II develops and clarifies the topic of concept portrayal as it applies to the production of protocol materials. The analysis of concepts, didactic issues in protocol development, and four stages of episode development in the production of protocol materials are discussed. A four-item bibliography is included. (MJM)

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Acquiring Teaching Competencies:

Reports and Studies

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I. An Introduction to Protocol and Training Materials

David Gliessman

II. The Portrayal of Concepts: An Issue in the Development of Protocol Materials

Bryce B. Hudgins

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Report #1, September, 1972

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Foreword

The two articles which follow constitute the substance of Issue #1 of a new publication series devoted to protocol and training materials, the first two of the numerous major concepts developed in *Teachers for the Real World*. As clearly and convincingly as these two ideas were presented, it was impossible to have anticipated the kinds of problems, clarifications, and extensions needed once efforts were mounted actually to produce prototypical materials. After two year's experience in the production of protocol materials and one year's experience with training materials, definite progress is being made, both conceptually and with respect to production and evaluative processes. It is time to begin reporting out the results.

The first article by one of the most experienced producers of these kinds of materials deals with the problem of definition and the relationship of definition to production. The author, David Gliessman, has extensive experience in the production of teacher training materials generally and is one of the pioneers in the development of protocol and training materials.

The second article looks at the very complex problem of taking a concept through all of the developmental stages from its beginning on the pages of a textbook or in the mind of a developer, to its final state as protocol materials. The author, Bryce B. Hudgins, also is emminently qualified to undertake this task by virtue of both his lengthy history as an educational psychologist, and as one of the original contractors to produce protocol materials.

From the standpoint of the editorial board, a primary objective of the publication series is to provide an outlet for ideas about protocol and training materials in teacher education. Over the series the aim is dialogue and discussion among producers, consumers, and critics with these articles as the initial stimuli.

L. D. Brown, *Editor*

An Introduction to Protocol and Training Materials

David Gliessman

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Professionals in teacher education have been as energetic (perhaps the word is profligate) as any other educators in the production of materials. Anyone who is on several publishers' mailing lists must be impressed by the number of textbooks that enter the market each year. One major publisher alone lists well over two hundred titles of available textbooks in teacher education. The most recent Catalog of educational motion pictures (1970) available in the Film Library at Indiana University lists approximately five hundred motion pictures in some aspect of professional teacher education. When one adds to this the various specialized materials (for example, programmed learning materials and multi-media units) produced by such agencies as development laboratories, the number of material resources becomes staggering rather than simply impressive.

In light of this abundance, one is a bit reluctant to argue for more--unless it is clearly evident that certain important goals in teacher education are not well served by existing materials. It is possible, in fact, that a bias does exist in this general array of materials (with some notable exceptions, of course). This bias seems clearly to be toward informing, in some sense of that word. Informing the teacher about data, concepts, issues, methodologies and skills seems to be the major purpose of much existing instructional material. Goals in the preparation of teachers, on the other hand, go far beyond the informational. The acquisition of operable teaching skills is surely a universal emphasis in teacher education programs. Competence in the less observable acts

of diagnosis, interpretation and evaluation is a hoped-for outcome of most teacher preparation. Yet the means of achieving either of these goals have been rudimentary at best. One has little confidence, to begin with, that a sufficient number or variety of well-conceived materials exist for the attainment of goals such as these.

It was to the problem of achieving interpretive competencies and operable skills that B.O. Smith addressed himself when he identified a need for "protocol materials" and "training materials" in teacher education. (Smith, 1969, 1970) Ideally, he viewed the preparation of teachers as including two very general programmatic components: a theoretical or conceptual component and a methodological or skills component. The first of these has as its aim the development of interpretive competencies. These competencies are based on the acquisition of a functional understanding of philosophical, psychological and social concepts as well as concepts from the basic fields of knowledge (e.g. language, biological sciences, the arts). The second component has as its aim the development of the specific skills that are involved in teaching. These might include, for example, skills in questioning, in conducting class discussion, in test preparation, in evaluation and assessment. Practically speaking, it is probably not wise to push the distinction between these two components too far; in the reality of teacher preparation, such differential outcomes cannot be neatly arranged. However, the point of the distinction seems sound: that in any teacher education program, the acquisition of both interpretive competencies and specific skills should be major emphases.

Accomplishing either of these objectives is no small order. One will not find an explicit strategy for doing so in Teachers for the real world nor anywhere else for that matter. Smith's point simply was that newly

conceived and newly specified materials would be important in the development of any programmatic efforts to accomplish these objectives. Specifically, he identified a need for protocol materials to be used in the theoretical or conceptual component and training materials to be used in the methodological or skills component of teacher preparation. The conceptions behind each type of material are different and it is one of the purposes of this paper to introduce the characteristics of each. It is not altogether clear at this point, however, whether protocol and training materials will ultimately assume different forms or serve entirely distinctive purposes. It is simply too early in the process of development to tell. Hopefully, in the discussion that follows, the evolving nature of each type of material will be evident.

Protocol Materials

Protocol materials were originally conceived to be a documentary record (on audiotape, videotape or film) of the actual behavior of teachers and pupils in classroom and other school settings. This documentary material was to serve as raw material for interpretation using concepts basic to teacher education (for example, psychological, social and pedagogical concepts). The result of such interpretation would presumably be a more complete understanding of these concepts (because they would have been related to their referents in behavior) and an increase in the ability to use them interpretively. In a sense, protocol materials were to be a means of conjoining concept and behavior in an interpretive act.

A little thought tends to support the general reasonableness of this conception. Many of the concepts that form the substance of professional teacher education refer to behavior. That is, they are intended to describe or interpret actual behavior. Yet the means of treating these con-

cepts have been largely verbal, through printed material and classroom discussion. If teachers are to develop the ability to use concepts interpretively, however, verbal instruction alone is almost certainly insufficient. There must be an opportunity to observe and interpret on-going behavior using concepts in a systematic way. The purpose of protocol materials is to provide such interpretable, on-going behavior. In fact, Smith apparently used the term in the sense of an "original record" of behavior or behavioral events.

Beginning with this conceptual framework, the Office of Education began the development and production of protocol materials approximately two years ago. Initially, ten university-based projects were funded to develop pilot protocol materials based on a variety of psychological, sociological and pedagogical concepts. Not surprisingly, in retrospect, the actual process of developing such materials has turned out to be a decidedly more complex matter than was originally anticipated. In fact, the complexities of development have been the substance of a series of intensive meetings beginning with the inception of USOE funding and involving all project directors.

The developer of protocol materials is faced with a two-fold problem, an analytic one and a technical one. He ignores either at his peril. To put the matter all too simply, he must find a way to clearly exemplify a well defined concept or set of concepts in an audiotape or motion picture film of high technical quality. In this process, the developer may go wrong at any one or all of several points. One can, without apology, admit the occurrence of a full range of "wrong moves" in the pilot projects during the past two years.

In the analytic realm, the developer is faced with the problems of

selecting concepts that have some generality, utility and interpretive power; framing explicit definitions of the concepts that he does select; identifying the significant dimensions, components and behavioral attributes of his concepts; specifying situations to be taped or filmed that will contain unambiguous examples of these concepts. This is no small order of tasks which is probably one reason why such a level and refinement of analysis is not typically devoted to concepts in teacher education. One of the unexpected results of the protocol effort so far, in fact, is what it has revealed about the ambiguity of some of the working concepts in teacher education. At the same time, it has become clearly apparent that such a systematic analysis of concepts is at the heart of developing valid and useful protocol materials. Ultimately, each developer must conscientiously attempt to conduct such an analysis of the concepts upon which he has tentatively decided to base his protocol materials. One of the obstacles to fulfilling this requirement, however, is that the dimensions and standards of such an analytic process are not widely understood in teacher education. For this reason, a careful exploration and explication of this analytic process should be the subject of continued discussion and writing.

Somewhere between this major task of analysis and the technical problems of actual production, the developer is also faced with a problem in instructional design: deciding upon a format for his protocol materials particularly with reference to the complexity of the behavioral situations that he tapes or films. It is clear by now that the original conception of protocol material as an unedited documentation of behavior was an imperfect one. "Critical" behaviors do not always occur with sufficient frequency or clarity in on-going situations to

be "captured" by means of documentary techniques. In one way or another, the developers of the pilot materials have found it necessary to assure the occurrence and to increase the salience of the behavior exemplifying the concepts they have selected. This has been accomplished by various means including more or less subtle "staging" of events, judicious editing of the tape or film and the use of titles or labels identifying critical behaviors. The use of such techniques has certainly modified or broadened the original conception of protocol materials. However, this change has generally resulted from the experience of attempting to produce protocols that are conceptually clear. The philosophical and instructional implications of this change may well deserve continued analysis and discussion.

Thinking in terms of ultimate instructional strategies, a few developers have moved to the production of very brief film clips in an attempt to further isolate critical behaviors. The protocol project at Indiana University, for example, is concentrating on the development of protocol films in two forms: (a.) film clips that as clearly and "cleanly" as possible exemplify a given concept and (b.) somewhat longer films of complex behavioral events that are interpretable in terms of a set of such concepts. Thus, the learner might be introduced to the concept of "approving" or "accepting" reactions on the part of the teacher by viewing a number of brief clips simply showing teacher reactions to pupil responses. These clips will be carefully selected to exhibit different dimensions of approval or acceptance by a number of different teachers in different classroom settings. Once having acquired the concept, the student would be in a position to recognize examples or instances of it in longer films when the critical behaviors are embedded in more complex classroom interaction.

Furthermore, he would presumably be prepared to identify some of the antecedents and outcomes of approving or accepting pupil responses---in short, to incorporate the concept in a broader interpretive act. One might assume that such a progression from simple to complex portrayals of behavior would lead to a surer acquisition of the concept. This is an assumption that can and should be tested empirically, however, using carefully designed protocol materials.

Finally, the developer must attend to the problem of producing material of high technical standards. Patently "home made" tapes and films will not do. The developers of the pilot protocol materials have in large measure rejected the naive assumption that users will overlook technical inadequacy and lack of authenticity for the sake of having "conceptually sound" materials. Fortunately or unfortunately, the professional consumer probably reacts to technical quality as quickly and surely as he may to conceptual quality. The fact that the developer is producing materials that are unique conceptually does not allow him to "beg" technical standards. Having agreed that high technical standards are desirable, the task remains of specifying what these standards should be. This leads inevitably to questions of sound quality, picture quality and the means of assessing each.

Further technical questions concern the choice of specific media and, equally important, the "mixture" of media to be included in a single set of protocol materials. An especially vexing problem here concerns the place of printed material. Thus far, developers have tended to depend upon printed material (in copious quantity) as the instructional support for their protocol materials. The wisdom of doing this, in terms of obtaining wide and effective use of protocol materials, is certainly

an open question.

From all that has been said above, a few things should be evident. The successful development of protocol materials is a complex and exacting task. This is partly because it depends upon such varied conceptual and technical skills. However, it is also because the developer is working in a most difficult substantive area: the margin between concept and behavior, concept and referent. In short, the area of interpretation. The need is clear for continued theoretical, empirical and technical investigation to reduce this complexity.

Training Materials

Unlike that of protocol materials, the concept of training materials is not a new one even in teacher education. The use of materials specifically designed to aid in the acquisition of skills has a long tradition in industrial and military training as well as in education. In teacher education, a variety of training materials have been produced by universities, development centers and regional laboratories. These materials have been designed to be used in the acquisition of such skills as questioning, presentation of subject matter, conducting inquiry and motivating learning. This variety of materials is not characterized by a common format although those that are more widely distributed generally provide filmed examples of the skill in context. The media used include motion picture film, printed materials, audiotapes and slides. Because the skills involved in teaching are numerous, incompletely specified, and essentially unclassified, it would be difficult to judge how comprehensive these existing materials are even if they were completely catalogued. One gets the impression, however, of a great deal of unevenness and considerable redundancy in the skills treated. Some of the more widely distributed of

these materials, for example, concentrate on a rather limited (though not insignificant) set of classroom interaction skills.

A recent venture in the production of training materials is that undertaken by the National Center for the Development of Training Materials in Teacher Education based at Indiana University. Under Office of Education funding, associates of the National Center are developing training materials for the acquisition of teaching skills ranging from "making drawings that teach" at the elementary level to "teaching for mastery" at the secondary level. Several other funded projects are presently investigating areas directly related to the development of training materials. A project at the University of Miami (working within the Florida State Consortium) is attempting to describe and catalogue the available training materials in teacher education. A related project at Florida State University is developing a classification system for competency based teacher education. Finally, efforts are being made at a national level to begin a comprehensive identification of the significant concepts and skills to be incorporated in teacher education.

The demands for analytical thoroughness and technical proficiency are as central in the development of training materials as they are in the development of protocol materials. It seems clear that any teaching skill to be acquired through the use of training materials must be analyzed as carefully as are concepts in the case of protocol materials. Ideally, a skill should be selected in terms of its generalizability and utility; the selected skill should be specified and defined behaviorally; finally it should be analyzed for its components somewhat as concepts are analyzed for their dimensions and attributes. Ultimately, one of

the major instructional functions of training materials themselves might be that of presenting clear examples or instances of the components of a complex teaching skill.

Statements of technical specifications and standards are as applicable to training materials as they are to protocol materials. Training materials are likely to include a variety of media and, once again, the media used should not fall short in technical quality. An important consideration in the choice of media for both training and protocol materials is that of distribution. Because of certain technical characteristics of specific media and because of certain habits of media users, some types and mixtures of media are probably more easily distributed than others. The settings in which training materials are to be used, too, should have some influence on the media finally selected. It is apparent, then, that the analytic and technical tasks in the development of training materials are not dissimilar to those involved in the development of protocol materials.

However, the design of a format for training materials is likely to present the developer with some unique problems. Unlike the act of interpretation (which is essentially a cognitive process), the act of performing a complex teaching skill might well involve social and psychomotor processes as well as cognitive processes. Furthermore, it is generally agreed that performance and feedback on one's performance is a critical element in skill acquisition. Finally, the range of skills involved in teaching vary greatly in nature and complexity. Such characteristics of teaching skills and skill acquisition seem to call for a considerable degree of innovation and experimentation in the design of training materials. Only a beginning seems to have been made in fitting

the format of training materials to the special conditions and processes involved in acquiring a complex skill.

Evaluation of Outcomes

The use of training materials is clearly tied to measurable outcomes. Since the emphasis in such materials is often on overt or observable skills, the problem of evaluation is greatly simplified. At the most elementary level, the evaluation task consists of noting whether or not the learner can demonstrate a given teaching skill in, perhaps, a simulated setting such as microteaching. As long as a skill is defined and specified behaviorally, it should be possible to observe its presence with some degree of reliability.

It is a bit surprising, however, to note that the same emphasis on measurable outcomes has characterized the development of protocol materials from the beginning. In this case, after all, one is dealing with the kind of complex cognitive process which has often discouraged attempts at evaluation. However, the early emphasis on a careful analysis of the concepts to be used in protocol materials did much to lay a foundation for objective evaluation. If a concept can be defined and its attributes in behavior identified, the acquisition of that concept is potentially measurable. The general question for evaluation is whether or not the learner can reliably identify instances of a concept in more and less complex behavioral settings.

It is highly desirable that this acquisition of concepts and skills be evaluated under conditions that are as near as possible to a "real behavioral setting" and yet are manageable in terms of measurement. In the case of skilled performance, as indicated above, the implication of such a specification is that the learner will be called upon to perform

the skill in at least a simulated classroom or group setting. In the case of concept acquisition, the implication is that the learner will be called upon to identify instances of a concept in taped or filmed recordings of behavior rather than in printed descriptions of behavior. The use of printed material can perhaps be regarded as an adjunct evaluation device at best. In either case, it is clear that considerable innovation is called for in devising a format for evaluation. Once again, especially in the case of concept acquisition, the development of the needed evaluation instruments and strategies is only at a beginning stage.

In spite of the importance and complexity of the above tasks, it should be understood that assessing the acquisition of a specific concept or skill is only a first step in the larger problem of evaluating interpretive competence and teaching competence. Of course, the understanding of concepts is the basis of interpretive competence just as specific skills are components of teaching performance in a larger sense. However, at some point, evaluation must be directed at these more complex levels of performance. In the case of interpretive competence, a means must be devised to determine if the learner can use a set of acquired concepts in a more complex interpretive act; in the case of skill acquisition, a means must be devised to assess a learner's performance in using skills appropriately and flexibly within a larger teaching act. Such levels of evaluation will obviously depend on the development of sophistocated instruments and methods of evaluation.

Next Steps

It should be apparent by now why this paper has attempted to do little more than provide an introduction to protocol and training mater-

ials. The state of the knowledge about each is introductory at best. The specifications for each type of material are tentative, the existing materials can only be regarded as first approximations, problems of utilization have only been touched upon, the attempts at evaluation are at a beginning level. If protocol and training materials are to make a significant contribution to the preparation of teachers, two needs are clearly in order. First, there must be a continued development of concrete protocol and training materials. Actual production is important not only for introducing needed materials into teacher education programs but because each accomplishment and each misstep clarifies future possibilities and directions. It is probably counterproductive, in any case, to delay production pending definitive statements; experience with actual products is instrumental in shaping definitive statements. In the case of protocol materials, for example, much of the early speculation and discussion about their "proper form" proved to be academic once actual materials were available for evaluation and use.

On the other hand, a consistent danger for those involved in materials production is the tendency to focus entirely on their products. The result is that problems of definition are given little attention. Problems of materials specifications, of productive developmental strategies, of evaluative procedures and criteria are solved but only for the producer and remain a kind of "private stock" of knowledge to be rediscovered by other producers. The avoidance of this state of affairs must become a primary need. Stated positively, the second point then is that it is equally clear that there must be continuous writing and discussion of the conceptual, technical, developmental bases for each type of material. Intelligent planning and production cannot occur without it.

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The Portrayal of Concepts: an Issue in the Development of Protocol Materials*

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The purpose of this paper is to develop and clarify the topic of concept portrayal as it applies to the production of protocol materials. It is not our purpose to delineate the nature of protocol materials here, but a few words about that concept seem to be in order, simply to place our discussion in an appropriate context. A protocol is essentially the portrayal of a concept. In the present case, such a concept would be pertinent to teacher education, either a concept about the subject matter the teacher deals with, or a concept about teaching itself. Furthermore, the portrayal of a concept means something other than a dictionary definition of the label given to the concept. For our purpose, the portrayal involves laying out, through a series of episodes, the one or more characteristics that, together, exemplify the concept to be portrayed. If, for example, one were going to develop a protocol of the concept positive reinforcement as part of a psychological foundations component of teacher education, all the elements that are critical to the concept would have to be portrayed in the finished protocol. Thus, we would want scenes or dialogues that

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illustrate the following events and sequences: (a) the occurrences of the responses, (b) the rewarding or reinforcing stimuli which follow the responses, (c) repetition of elements (a) and (b), (d) switching to scenes which recreate events highly similar to those in (a), and (e) switching to responses similar to those in (a). Of course, one or even all of these stages might have to be repeated in the development of the protocol. That would be a matter of judgment regarding the didactic, or teaching demands of the protocol. Similarly, the portrayal sketched above would probably not exhaust the meanings of the concept "positive reinforcement". There probably never comes a point beyond which an abstract concept cannot be further developed. Even with these disclaimers, the sequence of events above, if they were fulfilled with clear and appropriate examples of the elements or subconcepts indicated, would provide at least a first approximation to the idea of the portrayal of a concept. Although there are other factors that enter into the ultimate success of a protocol, conceptual issues are a central consideration, and a first consideration. There is probably no time during the development of a protocol that conceptual issues can be ignored. The educational value of what emerges, through whatever medium the developer finally settles upon, cannot exceed the quality of conceptualization that has gone into it, no matter how fine the technical production may be.

What kinds of outcomes emerge from analysis of concepts that are of use to protocol developers? There seem to be three broad topics in the conceptual realm that developers must work with in producing protocol materials. These are: (a) analytic issues, (b) didactic issues, and (c) outcomes.

Before we turn to these issues, let us introduce a few terms that might be widely adopted for discussions about protocols as a problem in concept analysis and concept teaching. Psychologists have reported so many studies of concept learning over the past fifty years that the literature abounds with multiple terms for similar references. Throughout this paper a small set of "middle of the road" terms are used to speak about concepts; terms that do not commit us to any particular systematic position. Thus, an example of a concept is simply a concrete representation of behavior which has a given label associated with it. An example might be a brief bit of classroom interaction in which the teacher reacts in a given way to some response from a student. Our example may be either positive (meaning that it is a case of the concept we wish to portray), or negative (meaning that in one or more aspects the example does not portray the concept). Concepts may have multiple dimensions. To have a positive example of a concept would require that all the requisite dimensions of the concept be portrayed. To illustrate, when teachers "accept" some behavior from a student, we would ordinarily anticipate that two dimensions of the concept must be involved. One of these is a dimension of rating on the part of the teacher. The other would typically be a dimension of responding by the pupil.

To avoid confusion at this point, let us try two simple examples. Here is a positive example of "teacher accepting reaction".

P: The angles of a triangle add up to 180 degrees.

T: Good for you! That's exactly right!

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The above example is positive because the pupil has clearly responded

in his behavior, and the teacher reacts with a rating. The following example is negative for "teacher accepting reaction".

P: How do you solve Problem 8?

T: I know you'll find a way. You're a good student.

*****

Although the teacher's reaction is generally constructive and encouraging, it does not imply acceptance of the student's behavior. Neither is the statement by the student a response. If these distinctions sound minimal, remember that one of the purposes in producing protocols is to remove conceptual ambiguity that often intrudes into discussions of classroom behavior.

A final term we will use for talking about concept examples is value. Most dimensions of concepts can have more than a single value. One way in which values of a dimension can differ is in the form of behavior involved; for example, verbal versus non-verbal. Let us reconsider the first positive example above in an altered context.

> The scene is a junior high school mathematics class. A boy working at the board computes the magnitude of each angle of a triangle. He then writes on the board '180 degrees'. The teacher smiles, touches the boy lightly on the shoulder, and nods his head.

Those terms may be useful in thinking about the concepts to be portrayed in protocols. What the dimensions, and what their values, is a question to be answered through analysis of the specific content or concept to be portrayed.

Let us more fully elaborate the three major questions of the dis-

cussion: (a) analytic issues (b) didactic issues, and (c) outcomes. Analytic issues are those that one confronts when he moves from the point of having identified a concept to be translated into a protocol to the point of considering the range and types of behavior to be captured in order to fully and fairly portray it. Key analytic questions are the specifications of the dimensions and values of the concept. Subordinate but very time-consuming and demanding questions concern the properties of examples, both positive and negative. The purpose of this phase of conceptual analysis has nothing directly to do with efforts to make the protocol teachable. Its purpose, rather, is to make the best possible effort to insure that the classes of examples to be searched for will represent the concept comprehensively and exhaustively.

Didactic issues, on the other hand, are those that compel us to grapple with questions of the complexity of our examples, sequencing of examples, manipulating the range of discriminations the learner must make, definitions, and descriptions of the concept to be taught. If this phase of the conceptual development is well done, it should eventuate in a comprehensive identification of the scenes or episodes that must be produced, or selected from film, or otherwise generated to construct the finished protocol. It cannot, of course, specify precisely the number of episodes of each kind that will be required, but beyond that, when this stage has been completed, most of the questions about needed episodes should be answerable.

Decisions about the outcomes for learners will be instrumental in determining the graduated complexity of the episodes that compose the protocol. Outcomes for protocols could be set at any number of levels,

but ordinarily there would be two chief ones. They might represent an intermediate and a final level for any protocol, or the developer might choose to shoot for only one or the other. At one level, the learner's task is simply to identify examples of the concept. In effect, an example is given, and if the learner correctly identifies it as a positive example, the task has been learned. Clearly, this is not a single level but many, and the criterial questions can range anywhere between requesting identification of a simple, clear positive example earlier seen and identified as such to new examples never seen before, with high background noise, in which fine discriminations are required from the learner, and so forth. However, in both cases, the developer is still in the position of clearly identifying the episode to be tested, and asking the question, "Is this X or isn't it?" We would undoubtedly have much greater confidence in the judgment coming from the second case than the first, but it is still a question of the structure being imposed by the developer.

A second level which, like the first, represents numerous sub-levels, is established when the learner views an extended segment of the film, or reads a lengthy passage of classroom transcript, or whatever it may be, and identifies and makes use of the concept or concepts of the program to analyze (interpret) what has transpired during that instructional interval. When the learner can perform at this level, there would be little question that he has an understanding of the meaning of relevant classroom behaviors at the conceptual level. This would seem to be a high level and desirable state of affairs that represents the objectives of the protocols program. It is an outcome distinctly different from an outcome of training, and it in no way warrants the ability of the learner to construct or to perform the behavior illustrated in the protocol. To the extent that we believe

teachers should be able to conceptualize and to analyze instructional practice, such outcomes would seem to be of the first magnitude of importance.

The Analysis of Concepts*

Analysis of a concept involves laying out the several component parts that most concepts worthy of protocol development are likely to have, identifying those parts, the conditions under which each occurs or its correlates, the events that predictably follow it, or its consequences, and a consideration of the relationships between or among

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* Our discussion of the analysis of concepts undoubtedly contains many assumptions, but there is one of which we are particularly aware, and which must be explicated at the outset. There are numerous ways in which concepts can be developed (produced, as contrasted with analyzed) that are not considered in this paper. The principal reference throughout is to empirical analyses of concepts. When one is in the process of developing new concepts, as is often the case in basic research, empirical analysis is not possible, or at any rate would contribute very little to the investigator's purposes. The assumption being made in this paper is that the fundamental purpose of protocol materials (and the same would be true for training materials) is to teach concepts that are of sufficient importance to merit inclusion in programs of teacher education. One implication of that assumption is that most, perhaps all, of the concepts selected for development in the national protocols program will have been the object of considerable attention by research workers or educational developers. On the one hand, this should guarantee the protocol developer a body of empirical knowledge to draw on for his purposes, and on the other, its absence may alert him to question whether his concept is sufficiently well established to compete in the conceptual marketplace with other more fully developed concepts in teacher education. Not all of the current programs share this assumption. Probably alternative conceptual models will be needed for those programs. The purpose in identifying the underlying assumption here is to call attention to such differences and such needs, and not to argue for the exclusion of what in some cases are excellent and provocative materials. There are areas of knowledge in which the concept of empirical analysis as used here is not very meaningful. Teachers of literature, for example, may have a commonly held conception of the "psychological motivation of a character" which would succumb to analysis of a sort similar to what is called empirical analysis in this paper.

the various components. Such analysis is one of the preliminary activities that the developer must undertake, and it is a most challenging one. The orientation that pervades this analysis is not one of "how to portray" the concept, although perhaps no developer worthy of his keep can ever stray very far from that primary preoccupation. Rather the concern during this phase is for the question, "What does the concept look like in its entirety?" This conceptual analysis is a blueprint from which the developer will build his protocol. If the analysis is faulty, he may wind up with a protocol that only partially portrays the concept, or which is inconsistent, or overlaps and can be confused with another concept.

To pursue the notion of the conceptual analysis as a blueprint, let us take a concept, attempt an analysis of it, and see what kind of a blueprint we arrive at when we have finished.

Empirical Study of the Concept

The concept we have chosen for analysis is "teachers' accepting reactions." In general, the concept covers those situations where the teacher greets a statement by a pupil with an expression, gesture, or statement of his own that indicates approval, encouragement, praise, or some other positive reaction to the pupil's contribution to class interaction. It also includes cases in which the teacher must correct or disagree with some or all of the content of the child's remark, but at the same time communicates his unwillingness to reject the pupil's effort, and a desire to continue the encounter.

Once we have identified the general domain in which the concept resides, we immediately begin to ask whether there is information abroad that will enable us to dimensionalize the concept in some productive

way, and to learn something about its occurrence and form in the real world of teaching that would be important to know as we undertake the development of a protocol. What kind of information would fulfill these functions?

Empirical studies of classroom behavior would seem to be a first domain to be examined, and within it, particularly systems that have attempted to analyze what the teacher does verbally or otherwise vis a vis the spoken language of children.

Although we shall be deeply involved here in a consideration of the work of Arno Bellack and his associates as it helps us to analyze the concept before us, we must make clear the more general point. Most concepts that are selected for protocol development are concepts that involve human behavior. In turn, such behavioral concepts ordinarily have been the subject of at least some empirical investigation in the past. One of the first productive steps the developer as analyst can take is to examine appropriate empirical sources for information about his concept. That examination can provide two kinds of information of a positive sort, and a third kind that may be negative. Of the first two, the developer can learn what the basic dimensions are of his concept, and something of the relative frequency with which the concept occurs in its various forms. Such information should have great implications for the relative emphasis ultimately reflected in the protocols that are later to be developed. As a derivative of the foregoing, the developer may also begin to form some hunches about the media he may choose for some or all of his work on a particular concept. For example, if empirical sources indicate that the key information about the concept is rarely communicated through intonation, voice inflection, or non-

verbal behavior, such as facial expressions and gestures, the developer might elect to avoid visual or audio media altogether. Conversely, his empirical data sources may also help him to decide that film is indispensible to his portrayal; that without it, the development of his concept must necessarily be restricted and incomplete.

On the negative side, categories developed for purposes of research are frequently abstract and, obviously, conceptual, as opposed to concrete and illustrative. Not only are they unlikely to be a good source of examples of the concept, which is a particular problem for the developer, but they are often not helpful in determining the boundary lines between various values of the same dimension of a concept, or between dimensions themselves. This suggests that the developer frequently will need to engage in reliability studies similar to those the researcher conducts, as he begins to build libraries of examples of the concept.

To return once again to cases, this test of empirical sources works very well for the present concept. Although other inquiries could be consulted as well, the painstaking classroom study by Arno A. Bellack (1966) and his associates, reported in The language of the classroom, is an extremely informative and helpful source for purposes of the present analysis.

In the first place, the concept, teacher's accepting reactions, can be placed into a broader framework of concepts used to analyze teaching. An examination of Bellack's work reveals that classroom language is categorized into four kinds of moves, which are labelled structuring, soliciting, responding, and reacting. Almost 40 per cent of all moves that teachers make in the classroom are classified as reacting moves, and they account for about 45 per cent of the words

teachers speak (actually lines of transcript, which amounts to the same thing). These statistics are cited because they provide graphic support for the empirical importance of reacting moves as a tool in the teacher's repertoire.

Reacting moves turn out to be of several types, one of which is "rating". Rating reactions, in their turn, consist of some six types, which Bellack labels as "positive", "admitting", "repeating", "qualifying", "not admitting", and "negative". It is within the domain of rating moves that our concept of "teacher's accepting reactions" falls. Yet several of these types of ratings would seem to qualify as "accepting", and we shall have to proceed to clarify what is meant by each of them, to see whether we will ultimately need to incorporate more than a single class of examples or episodes to teach the concept of "teacher's accepting reactions".

The first four types have positive elements to them; i.e., "positive", "admitting", "repeating", and "qualifying". We would suppose, then, that for a reasonably full elaboration of the concept the developer would be required to include these four types, for each contributes some new dimension to the concept. This does not, of course, rule out the possibility that protocols would also be developed which depict the "not admitting" and "negative" forms, but the grounds for doing so would be didactic, not having to do with the analysis of the concept <u>per se</u>.

Further perusal of the data that have been obtained about teachers' rating behavior may pose a decision-making occasion for the developer. If "qualifying" ratings are considered to be negative, as Bellack construes them, then 80% of teacher ratings are positive. If "qualifying" moves, on the other hand, are construed as positive, as we have done

here, then accepting teacher ratings occur almost 93% of the time that teachers rate pupil behavior. Positive, admitting, and repeating each account for approximately 25% of the teacher's rating reactions. Qualifying ratings occur approximately 14% of the time.

Similarly, the developer needs to consider the circumstances under which the behavior occurs, or the occasions that call forth accepting type ratings by the teacher. Conceptually, there can be numerous of these. For example, either pauses in discourse, or some physical action can conceivably be the occasion for rating reactions. Indeed, these events do occur, but the frequency is so low (a combined 3%) that the developer would need to think carefully about including such protocols in his display, even though it can be argued that the concept will be incompletely portrayed without attention to such examples. In the same vein, reacting moves are occasioned or elicited by all four kinds of the moves that constitute the entire system of classroom language: structuring, soliciting, responding, and other reacting moves. However, two-thirds of reacting moves are occasioned by responding moves, and another one-fourth by other reacting moves. Less than eight per cent of reactions are preceded and called forth by structuring and soliciting moves. One further statistic: most of the time, a reacting move follows a single preceding move. More than one move precedes a reacting move in only 7% of the cases recorded by Bellack.

What does all this add up to? Does it tell the developer anything he needs and wants to know about the analysis of his concept, which in turn, will enable him to make a stronger portrayal of it as a protocol?

Reference to this single empirical source has, indeed, provided the developer with a wealth of valuable and specific information about his

concept. In the first place, it has suggested additional dimensions that must be incorporated into verbal definition of it, and which must also be portrayed, for full illustration of the concept.

The basic dimensions of "accepting reactions" are now seen to be "positive", "admitting", "repeating", and "qualifying". Each of these must be taught. Furthermore, the reaction of interest will almost always occur in a brief cycle that includes one move, followed by the reaction. The occasions when more than a single preceding move is involved are rare enough that we would probably not insist upon portrayal of them. In fact, they could represent a confusing element in portraying the concept. Similarly, although ratings occur in conjunction with all four kinds of basic moves, they follow responding and other rating moves with such high frequency that those sequential relationships must be portrayed.

An additional kind of information has been obtained, also, for use in the didactic phase of planning the protocol. That is, "negative" and "not admitting" behaviors represent negative examples of the concept to be portrayed, and such negative examples play a significant role in the process of teaching the concept.

Before we continue to that phase of the discussion, however, one important issue remains to be touched upon. Concepts may be analyzed in other than the empirical way that we have shown here, although we have tried to stress the significance of empirical analysis for protocol production. Nonetheless, there are concepts of great importance for teacher education that may have abundant empirical study and documentation in environments other than those which are most appropriate for teacher education. One such concept that comes to mind is the psychological concept of "positive reinforcement". There are few concepts in contemporary

behavioral science that have been more thoroughly analyzed and studied.

Yet there is not the classroom counterpart of the analysis of reinforcement that we have seen in the present case. It would seem patently foolish to suggest that reinforcement ought not to be portrayed as a protocol on those grounds, since at a guess, virtually all educational psychology courses incorporate, or might incorporate the concept, among their teachings. What sort of analysis would be productive in such a case?

Of course, one solution to this problem is for the developer to do precisely what we have done with "teacher's accepting reactions", and that is to make an empirical analysis of reinforcement as it appears in research literature. The resulting protocol might show laboratory animals, such as rats or pigeons, undergoing the shaping of instrumental responses, or it might recreate experimental situations for conditioning particular verbal behavior, motor responses, the treatment of stuttering, autistic behavior in children, or other situations in which intensive experimental studies of reinforcement have transpired. However, if the developer's purpose is to portray the concept in action in the classroom, an alternative kind of analysis must be undertaken. In such a case, he must take the basic components of the concept, which of course are well known, and begin to ask questions about their manifestation in classroom situations. From this analysis by analogy, some interesting observations should result. For one thing, the developer would probably succeed in being a great deal more concrete about the nature of classroom reinforcement than most textbooks or teacher education programs ever become. Secondly, we suspect he would conclude at some stage that the values of the concept manifest themselves differently in the classroom than in the Skinner

box, and his protocol would have to portray those differences.

A final comment in this analytical phase concerns the great potential for the improvement of our knowledge about teaching that can accrue from the development of protocol materials. One of the weaknesses of many concepts in teacher education besides their vagueness, is our lack of knowledge about their consequences. We know, for example, that in laboratory settings, reinforcement is defined in terms of its consequences, as a stimulus that increases the likelihood of recurrence of the response that it follows. If reinforcement is portrayed in the naturalistic setting of the classroom, we should have an ideal laboratory for observing its consequences in the complex social environment generated by a group of children and their teacher. The same thing can be said about "teacher's accepting reactions", and most of the other concepts that are being developed into protocols. The relatively small additional effort that would be required to study these effects would be compensated for by the manifold increases in knowledge and potential potency of teacher education that could ensue.

Didactic Issues in Protocol Development

We need a set of guiding principles to enable us to decide how our conceptual examples are to be placed in sequence, and whether supplementary materials are to be used, and how they can best be built into our teaching protocol. A simple set of principles, based upon some widely known and tested conceptions about learning and transfer, are suggested here. These principles are delineated with the assumption that we are talking about the teaching of a set of interrelated concepts, each of which has more than a single value of one dimension.

Recent writings of Smith (1967), Ausubel (1968), and Clark (1971)

contain certain parallel observations about the teaching of concepts. Smith found, for instance, that in ongoing secondary school classrooms, teachers and students develop strategies for concepts that call upon three kinds of moves: the concept may be described, or it may be compared with other concepts, or examples of it may be given. Of course, some strategies combine moves of different types. Ausubel emphasizes the importance of building clear, stable, unambiguous meanings in cognitive structure. Clark makes some similar suggestions in his uses of negative examples in the teaching of concepts. The product of my thinking about these didactic issues, based largely upon the writings of the three men identified here, is the following two principles and their application to protocol production:

1. The teaching of a concept should begin with clear, simple examples of its positive form, and move progressively through a series of stages that incorporate increasing stimulus complexity, and demand finer discriminations on the part of the learner.
2. A new, but related concept should be introduced only after the first concept has become clear, stable, and unambiguous Points of tangency between the two concepts should be stressed in an effort to keep them discriminably different from each other.

These principles can be reformulated in more concrete terms that begin to suggest a program of action for the developer.

1. Begin with one of the concepts to be taught. Define and describe it; give the learner as many conceptual hooks as possible.
   a. Construct simple, clear positive examples of the concept.

b. Use prompts or cues as necessary to simplify the concept.

c. Label the concept.

d. Sample all relevant dimensions and values.

e. Provide for learner responding to each example, and for feedback to him about the correctness of his responses.

2. Shift to other examples of the same concept.

a. Remain with positive examples of the concept.

b. In this stage, gradually eliminate the prompts and cues.

c. With progressive examples, increase the stimulus complexity; include more irrelevant cues.

d. Continue to give the learner a chance to reveal the extent of his learning.

3. Select a second, related concept for presentation. Relative to the first concept, this should be the most similar of those remaining to be presented.

a. Again, make use of labeling, cues, prompts, and other devices to simplify the stimuli that the learner must respond to.

b. Use these, and the text of your examples, to emphasize and clarify the basic similarities and differences between the new concept and the old.

Figure 1 is a recapitulation in schematic form of the dimension of four stages of episode development that follows.

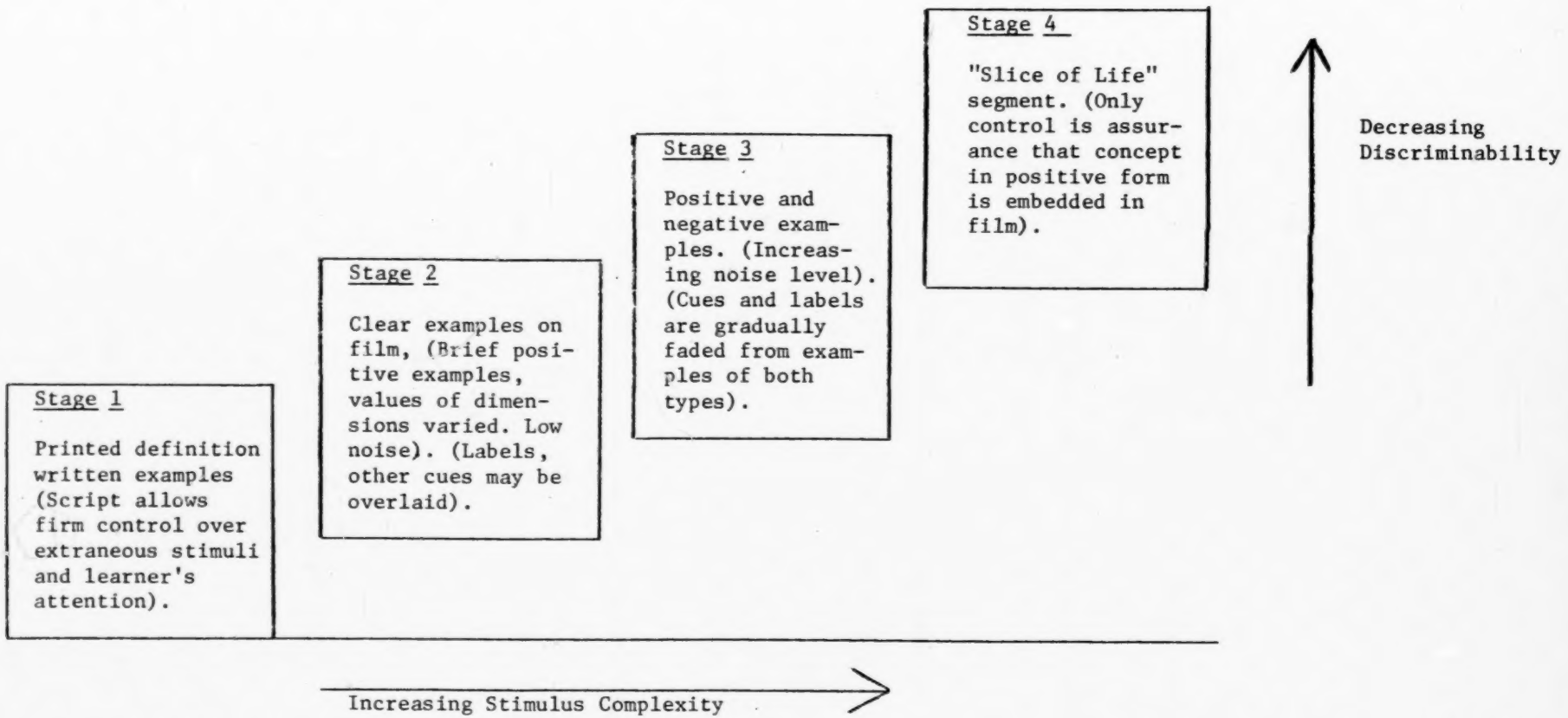
Stage 1
Printed definition written examples (Script allows firm control over extraneous stimuli and learner's attention).
Stage 2
Clear examples on film, (Brief positive examples, values of dimensions varied. Low noise). (Labels, other cues may be overlaid).
Stage 3
Positive and negative examples. (Increasing noise level). (Cues and labels are gradually faded from examples of both types).
Stage 4
"Slice of Life" segment. (Only control is assurance that concept in positive form is embedded in film).
Decreasing Discriminability
Increasing Stimulus Complexity

Figure 1: A Schema for Presenting Concepts in Media

Stage 1

An accepting reaction by the teacher occurs when a response by a pupil, or a rating by a pupil, but usually a pupil response, is followed by a rating from the teacher that either clearly is positive, or less clearly admits the response, or which simply paraphrases or repeats the response, or which results in a qualification by the teacher.

We begin this protocol with the concept of positive rating. When the teacher gives a positive rating, which may be either verbal or non-verbal, no doubt is left that she unequivocally accepts the response (or rating) of the pupil. Although the behavior of interest typically occurs embedded in a complex sequence of classroom interaction, the positive rating is restricted to the pupil reaction (or rating) followed by the teacher's reaction.

An example of such a cycle is given here:

First grader: (reading haltingly) Ted---throws---the---ball.

Teacher: Good girl, Cathy!

As we have indicated, some or all of the exchange could be non-verbal. For example, with a minor alteration, we would have the following, still an example of positive rating.

First grader: (reading haltingly) Ted---throws---the---ball.

Teacher: (Smiles, nods).

Stage 2

In this stage, media is used to portray the examples. All examples are positive, and they should be relatively clear and simple. Part of the appropriate strategy is gradually to increase complexity and reduce discriminability during this stage. This can be done by (a) gradually reducing labels, cues, and prompts, and (b) introducing examples that

are not restricted simply to the essentials of the concept being taught.

The following example, if appearing on film, would be a good introduction to Stage 2.

P: Andrew Johnson was impeached, he just wasn't convicted.
That is, the Senate decided he wasn't guilty.

T: Right on the head! That's a very good answer.

From a semantic standpoint, this example is no different from the one given for Stage 1. In fact, it is more complex because it occurs within the normal context of an ongoing classroom. The developer would be very careful in introducing this stage to label and cue the episode appropriately. He must, however, be equally careful in seeing to it that by the close of this stage, the learner is independent in his ability to identify and state criteria for episodes of this or somewhat greater stimulus complexity. Obviously this means the developer must be at pains to insure that learners are responding to appropriate elements of the substance of episodes, and not just to the cues or labels supplied in the early teaching episodes.

Stage 3

The tradition to Stage 3 is signalled by the complete absence of overlaid cues for positive examples, and by the introduction of negative examples, as well as less concern about controlling the noise level, or irrelevant stimuli that appear on film. For instance, embedded within the action of Stage 3, we might have episodes similar to the two that follow.

P: Jerry said the Republicans won the election of 1912, but Wilson was a Democrat.

T: Yes, he was.

P: Another cause of unemployment is that--well, if a man doesn't have a job--you know--he can't buy anything, and then that hurts business.

T: Oh? Well, I see your point. OK.

The example on the lefthand side is unmistakably one of a positive rating because the teacher accepts the pupil's response unequivocally as correct. It lacks the enthusiastic modifiers (and presumably the intonation that signifies enthusiasm as well) which have accompanied the earlier examples. The example on the right is not a positive rating; therefore, a negative example. Actually, it is intended to portray "admitting", in which the teacher's reaction, not positive, is mildly accepting or equivocally positive. When the negative examples call for initial subtle distinctions, cues may be provided, but they would be discontinued before the close of this stage. Stage 3 would not be complete until the learner can discriminate acceptable but less than totally clear examples of the concept to be learned from examples of other kinds of behavior that are similar to, but differ from the standard behavior on one or more dimensions.

At Stage 4, the learner should be capable of identifying any acceptable example of the concept as it appears in ongoing classroom behavior, even though it may be surrounded by negative examples and a high noise level, and using the concept to explain ongoing events. The developer's aim at this stage is to provide the student with as natural a slice of classroom life as he can capture. The only constraint under which he operates is that examples of the concept to be learned appear within the context of the film.

Summary

The purpose of this analysis has been to apply a simple theory of concept learning to the particular rigors of development involved in the production of protocol materials for teacher education. The theory says simply that the developer should begin the development process by, first, analyzing the concept he wishes to teach as carefully as he is able to do, and, as part of that process, lay out the particular dimensions and values of the concept that will need to be portrayed. From a practical point of view, the development of a library of appropriate examples is highly recommended. Examples may come either from existing materials, or may be constructed by the developer. They will tend to suggest to him in highly concrete terms the range of examples that must be utilized in developing his final materials.

At the didactic stage of development, he begins with examples of the concept to be taught that are as clear and as unequivocal as can be found or produced. That simplicity is combined with simplicity in media, also, for example, printed text may be used in the initial development because it controls perfectly for all background noise. The development continues by presenting the learner with multiple examples of all the appropriate dimensions of the concept. Ordinarily the developer's strategy in this regard would be to organize dimensions along a path of increasing stimulus complexity to heighten the possibility for positive transfer from one example or series of examples to the next.

At a more advanced stage, arbitrarily called here Stage 3, the developer not only generates extraneous noise in the background of his protocol; he also deliberately introduced non-examples, or negative examples of the concept. This is not done, in a tactical sense, until

there is good assurance that the learner has a firm understanding of the target concept in its range of dimensions and values. The introduction of negative examples at that time will help the learner to differentiate between the target concept and near relatives, as it were. If, however, negative examples are introduced too soon, the chances are good that the developer will create negative transfer instead of discrimination between concepts.

The final stage of this model is essentially a criterial one. The learner sees classroom behavior in all the richness and complexity that can be mustered on film, and identifies or selects examples of the target concept to help interpret or explain the events portrayed in the protocol.

Two final points must be made in the interests of clarity. One is that the stages described in this model are purely arbitrary, but have been imposed because they would seem to provide some helpful benchmarks for the developer. The other point is that the model described here will not and cannot provide data of the type and level required by the developer to make empirical decisions about the transition from one stage to the next. It should be clear that such data are needed throughout the developmental sequence, and would probably best be generated by the use of a small number of subjects who provide feedback to the developer, by viewing and responding to his preliminary efforts, about the number of episodes required, and how they should be articulated, one with another.

I have also suggested the need for alternative conceptual models to fit the case when the developer wishes to generate new concepts rather than to analyze and portray significant existing ones.

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